out_CLOCK   inp_CLOCK   inp_valid   inp_data

10

SPLITTER

split_CLOCK [0]   split_CLOCK [n-1]   split_data [n-1]

split_data [0]

12   *12*   *12*   *12*

CATCHER 0   CATCHER 1   CATCHER   CATCHER n-1

catched_valid [n-1]

catched_valid [0]

catched_data [0]   catched_data [n-1]

shift   valid   shift   data

16   *14*

SHIFTER 1   SHIFTER width

shifted_valid [n-1]

shifted_valid [0]   shifted_data [0]   shifted_data [n-1]

shifted_valid [k-1]   shifted_data [k-1]

tvalid [0] ••• tvalid [k-1]   tdata [0] ••• tdata [k-1]

18

k_TERMINAL

shift   valid   data[0]   data [k-1]
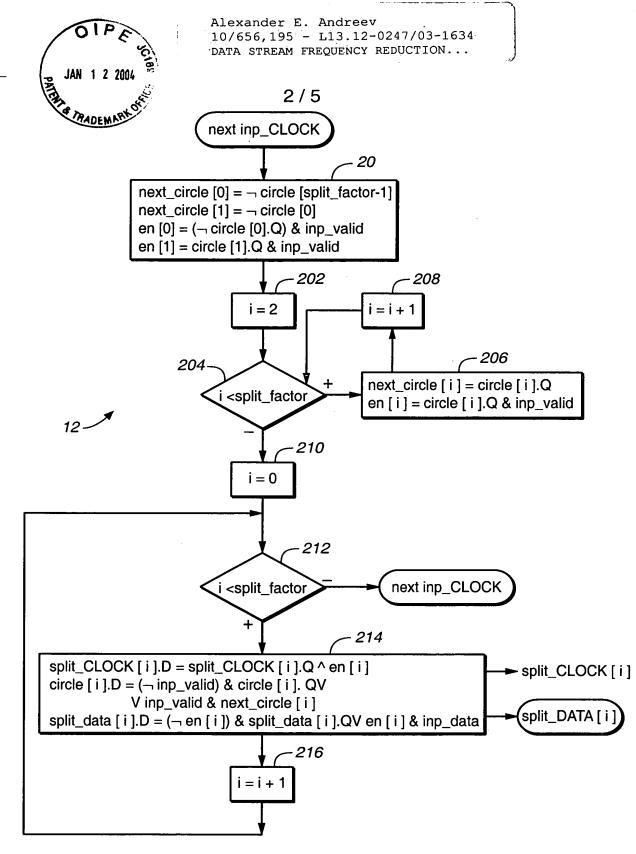
shift

out_valid   out_data [0]   out_data [k-1]

FIG._1

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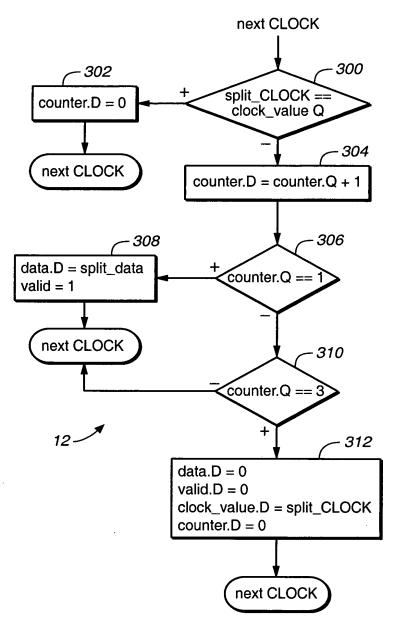next inp_CLOCK

20
next_circle [0] = ¬ circle [split_factor-1]
next_circle [1] = ¬ circle [0]
en [0] = (¬ circle [0].Q) & inp_valid
en [1] = circle [1].Q & inp_valid

202
i = 2

208
i = i + 1

204
i < split_factor

206
next_circle [i] = circle [i].Q
en [i] = circle [i].Q & inp_valid

210
i = 0

212
i < split_factor

next inp_CLOCK

214
split_CLOCK [i].D = split_CLOCK [i].Q ^ en [i]
circle [i].D = (¬ inp_valid) & circle [i]. QV
        V inp_valid & next_circle [i]
split_data [i].D = (¬ en [i]) & split_data [i].QV en [i] & inp_data

split_CLOCK [i]

split_DATA [i]

216
i = i + 1

12

FIG._2

next CLOCK

302

counter.D = 0

+

300

split_CLOCK ==
clock_value Q

next CLOCK

−

304

counter.D = counter.Q + 1

308

data.D = split_data
valid = 1

+

306

counter.Q == 1

next CLOCK

−

310

−

counter.Q == 3

next CLOCK

12

+

312

data.D = 0
valid.D = 0
clock_value.D = split_CLOCK
counter.D = 0

next CLOCK

FIG._3

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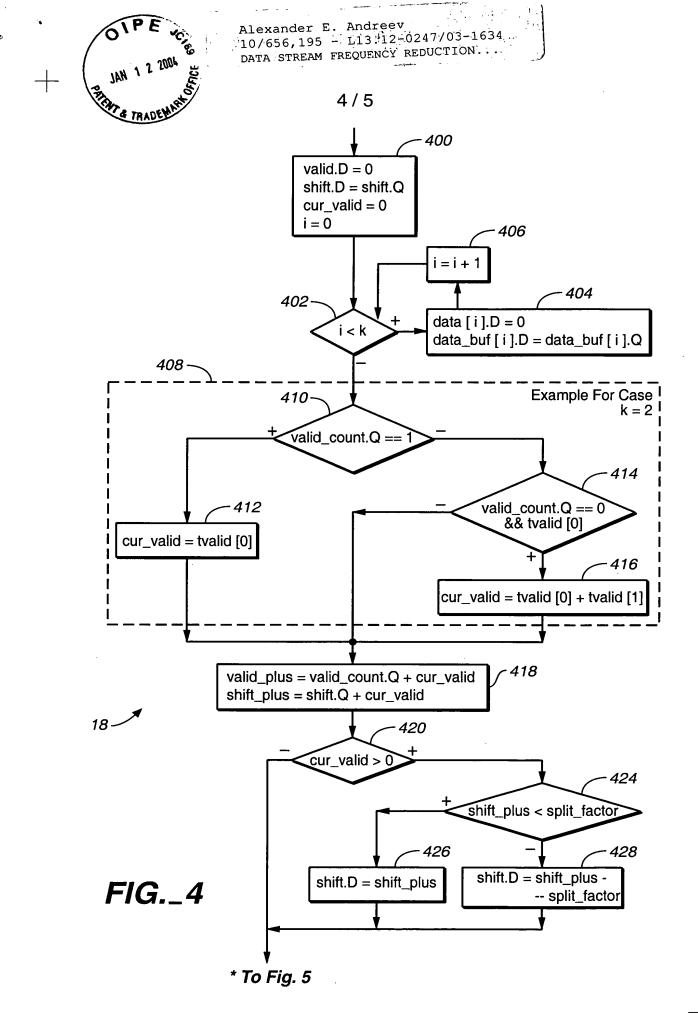10/656,195 – L13.12-0247/03-1634
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400

```
valid.D = 0
shift.D = shift.Q
cur_valid = 0
i = 0
```

406

```
i = i + 1
```

402

$i < k$

404

```
data [ i ].D = 0
data_buf [ i ].D = data_buf [ i ].Q
```

408

Example For Case
k = 2

410

$valid\_count.Q == 1$

414

$valid\_count.Q == 0$
$\&\& \ tvalid [0]$

412

```
cur_valid = tvalid [0]
```

416

```
cur_valid = tvalid [0] + tvalid [1]
```

418

```
valid_plus = valid_count.Q + cur_valid
shift_plus = shift.Q + cur_valid
```

18

420

$cur\_valid > 0$

424

$shift\_plus < split\_factor$

426

```
shift.D = shift_plus
```

428

```
shift.D = shift_plus -
-- split_factor
```

FIG._4

* To Fig. 5

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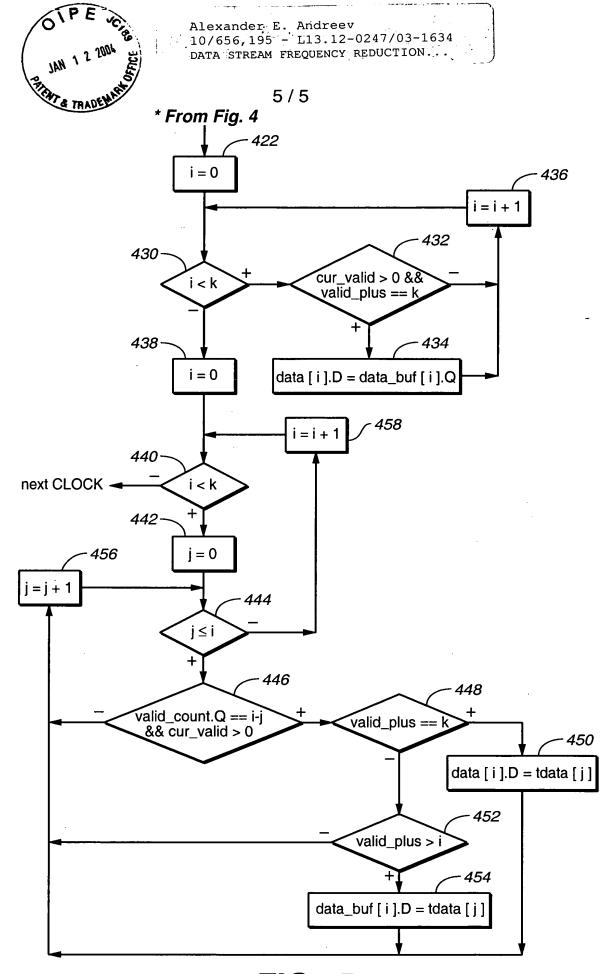***From Fig. 4**

i = 0 — *422*

i = i + 1 — *436*

430 — i < k

cur_valid > 0 &&
valid_plus == k — *432*

i = 0 — *438*

data [i].D = data_buf [i].Q — *434*

i = i + 1 — *458*

440 — i < k → next CLOCK

442 — j = 0

j = j + 1 — *456*

j ≤ i — *444*

valid_count.Q == i-j
&& cur_valid > 0 — *446*

valid_plus == k — *448*

data [i].D = tdata [j] — *450*

valid_plus > i — *452*

data_buf [i].D = tdata [j] — *454*

FIG._5